CLAIMS

What is claimed is:

1. An implantable cardiac lead system, comprising:

a cardiac lead; and

a sleeve arrangement provided on the lead, the sleeve arrangement comprising:

one or more first locations comprising a first material that substantially prevents tissue in-growth between the first locations and cardiac tissue contacting the first locations; and

one or more adhesion sites provided at the one or more first locations, the adhesion sites promoting tissue in-growth or attachment between the adhesion sites and cardiac tissue contacting the adhesion sites.

2. The system of claim 1, wherein the cardiac lead comprises one or more electrodes.

3. The system of claim 2, wherein the one or more electrodes comprise one or more of sensing, pacing, or shocking electrodes.

4. The system of claim 1, wherein the cardiac lead comprises one or more sensors.

5. The system of claim 4, wherein the one or more sensors comprise one or more of an accelerometer, pressure sensor, oxygen sensor, or temperature sensor.

6. The system of claim 1, wherein the lead system further comprises a drug delivery mechanism.

7. The system of claim 1, wherein the adhesion sites define apertures in the sleeve at the one or more first locations of the sleeve.

8. The system of claim 1, wherein the adhesion sites comprise a material that promotes cardiac tissue in-growth or attachment at the adhesion sites.

9. The system of claim 1, wherein the adhesion sites comprise exposed portions of the one or more electrodes.

10. The system of claim 1, wherein the adhesion sites comprise a structure having a porous surface that promotes cardiac tissue in-growth or attachment at the adhesion sites.

11. The system of claim 10, wherein the structure comprises a metallic annular structure.

12. The system of claim 1, wherein the first material comprises a first polymer material that substantially prevents tissue in-growth between the first locations and cardiac tissue contacting the first locations, and the adhesion sites comprise a second polymer material that promotes tissue in-growth or attachment between the adhesion sites and cardiac tissue contacting the adhesion sites.

13. The system of claim 12, wherein the second polymer material has a porosity differing from that of the first polymer material.

14. The system of claim 12, wherein the second polymer material has an average pore size differing from that of the first polymer material.

15. The system of claim 12, wherein the second polymer material has a distribution of pore sizes differing from that of the first polymer material.

16. The system of claim 12, wherein the second polymer material has a hydrophobicity differing from that of the first polymer material.

17. The system of claim 1, wherein the first material comprises a first type of PTFE, and a second material of the adhesion sites comprises a second type of PTFE.

18. The system of claim 1, wherein the first material comprises a first type of ePTFE, and a second material of the adhesion sites comprises a second type of ePTFE.

19. The system of claim 1, wherein the lead further comprises a bias mechanism proximate one or more of the adhesion sites.

20. The system of claim 19, wherein the bias mechanism comprises a biased coil electrode, a biased insulation material disposed on an outer layer of the lead, a biased structure operatively coupled to a lumen defined within the lead or a biased structure disposed on the outer layer of the lead.

21. An implantable cardiac lead system, comprising:

a lead comprising at least one electrode;

a sleeve covering all or a portion of the electrode;

a first fixation arrangement provided with the lead, the first fixation arrangement providing fixation between a first portion of the lead and coronary sinus vasculature or cardiac structure of the heart; and

a second fixation arrangement provided with the lead, the second fixation arrangement providing fixation between the coronary sinus vasculature or cardiac structure and a second portion of the lead.

22. The system of claim 21, wherein the first fixation arrangement comprises a first spiraled portion of the lead and the second fixation arrangement comprises a second spiraled portion of the lead.

23. The system of claim 22, wherein the second spiraled portion comprises silicone rubber or polyurethane rubber.

24. The system of claim 21, wherein:

the first fixation arrangement comprises a first spiraled portion of the lead, the first spiraled portion comprising at least a portion of the electrode; and

the second fixation arrangement comprises a second spiraled portion of the lead distal to the first spiraled portion.

25. The system of claim 21, wherein the first fixation arrangement or the second fixation arrangement comprises a tine.

26. The system of claim 21, wherein:

the first fixation arrangement comprises a spiraled portion of the lead; and

the second fixation arrangement comprises one or more adhesion sites provided with the sleeve for promoting coronary sinus tissue in-growth or attachment at the adhesion sites.

27. The system of claim 26, wherein the adhesion sites define apertures in the sleeve.

28. The system of claim 26, wherein the adhesion sites comprise a material that promotes coronary sinus tissue in-growth or attachment at the adhesion sites.

29. The system of claim 26, wherein the adhesion sites comprise one or more exposed portions of the electrode.

30. The system of claim 26, wherein the adhesion sites comprise a porous surface structure having one or more of a porosity, pore sizes, or pore size distribution that promotes coronary sinus tissue in-growth or attachment at the adhesion sites.

31. An implantable cardiac lead system, comprising:

a lead comprising a electrode;

a first fixation arrangement comprising a spiraled portion of the lead that provides a first fixation mechanism between the lead and coronary sinus tissue; and

a second fixation arrangement that provides a second fixation mechanism between the lead and coronary sinus tissue, the second fixation arrangement comprising a polymer sleeve arrangement encompassing all or a portion of the electrode, the polymer sleeve arrangement comprising one or more adhesion sites for promoting coronary sinus tissue in-growth or attachment at the adhesion sites.

32. The system of claim 31, wherein the one or more adhesion sites of the polymer sleeve arrangement comprise a first material that promotes coronary sinus tissue in-growth or attachment at the adhesion sites.

33. The system of claim 31, wherein:

the polymer sleeve arrangement, other than at the one or more adhesion sites, comprises a first material that prevents coronary sinus tissue in-growth; and

the one or more adhesion sites comprise a second material that promotes coronary sinus tissue in-growth or attachment at the adhesion sites.

34. The system of claim 33, wherein the second material comprises a type of PTFE that promotes coronary sinus tissue in-growth or attachment.

35. The system of claim 33, wherein the second material comprises a type of ePTFE that promotes coronary sinus tissue in-growth or attachment.

36. The system of claim 33, wherein the first material comprises a type of PTFE or ePTFE that prevents coronary sinus tissue in-growth.

37. The system of claim 31, wherein the one or more adhesion sites of the polymer sleeve arrangement comprises one or more partial or complete gaps provided on the polymer sleeve arrangement.

38. The system of claim 37, wherein the gaps comprise between about 1 percent and about 10 percent of a surface area of the polymer sleeve arrangement.

39. The system of claim 37, wherein the gaps comprise a circumferential dimension and a longitudinal dimension, the circumferential dimension being greater than the longitudinal dimension.

40. The system of claim 37, wherein the gaps comprise a circumferential dimension and a longitudinal dimension, the circumferential dimension being less than the longitudinal dimension.

41. The system of claim 37, wherein the gaps comprise a circumferential dimension and a longitudinal dimension, the circumferential dimension being substantially equal to the longitudinal dimension.

42. The system of claim 31, wherein the spiraled portion of the lead comprises at least a portion of the electrode.

43. A method of stabilizing a lead passing into a coronary sinus of a heart, comprising:

providing a sleeve arrangement on the lead, the lead including one or more first locations comprising a first material and one or more adhesion sites provided at the one or more first locations;

substantially preventing tissue in-growth between the first locations and cardiac tissue contacting the first locations; and

promoting tissue in-growth or attachment between the adhesion sites and cardiac tissue contacting the adhesion sites to enhance stabilization of the lead passing into the coronary sinus.

44. The method of claim 43, further comprising producing electrical energy at one or more of the adhesion sites.

45. The method of claim 43, further comprising sensing electrical energy at one or more of the adhesion sites.

46. The method of claim 43, further comprising sensing one or more physiologic parameters at one or more of the adhesion sites.

47. The method of claim 43, wherein promoting tissue in-growth or attachment comprises promoting tissue in-growth or attachment via apertures defined at the adhesion sites.

48. The method of claim 43, wherein promoting tissue in-growth or attachment comprises promoting tissue in-growth or attachment using a material that promotes cardiac tissue in-growth or attachment at the adhesion sites.

49. The method of claim 43, wherein promoting tissue in-growth or attachment comprises promoting tissue in-growth or attachment using one or more exposed portions of the one or more electrodes.

50. The method of claim 43, wherein promoting tissue in-growth or attachment comprises promoting tissue in-growth or attachment using a porous surface structure having one or more of a porosity, pore sizes or distribution of pore sizes that promote cardiac tissue in-growth or attachment at the adhesion sites.

51. The method of claim 43, wherein the first material comprises a first polymer material that substantially prevents tissue in-growth between the first locations and cardiac tissue contacting the first locations, and promoting tissue in-growth or attachment comprises promoting tissue in-growth or attachment using a second polymer material at the adhesion sites that promotes tissue in-growth or attachment between the adhesion sites and cardiac tissue contacting the adhesion sites.

52. The method of claim 43, wherein a second material is disposed at the adhesions sites, the method further comprising varying one or more of a porosity, pore sizes or distribution of pore sizes of the second material to be different from that of the first polymer material.

53. The method of claim 43, further comprising generating a bias force at or proximate one or more of the adhesion sites.

54. A method of stabilizing a lead passing into a coronary sinus of a heart, comprising:

providing a lead comprising at least one electrode;

stabilizing the lead at a first fixation location within a right atrium of the heart or a proximal portion of the coronary sinus; and

stabilizing the lead at a second fixation location within a distal portion of the coronary sinus.

55. The method of claim 54, wherein:

stabilizing the lead at the first fixation location comprises mechanically stabilizing the lead at the first fixation location; and

stabilizing the lead at the second fixation location comprises mechanically stabilizing the lead at the second fixation location.

56. The method of claim 55, wherein mechanically stabilizing the lead comprises using a spiraled portion of the lead at one of the first or second fixation locations to stabilize the lead.

57. The method of claim 55, wherein mechanically stabilizing the lead comprises using a first spiraled portion of the lead at the first fixation location and using a second spiraled portion of the lead at the second fixation location to stabilize the lead.

58. The method of claim 54, wherein:

stabilizing the lead at the first fixation location comprises mechanically stabilizing the lead at the first fixation location; and

stabilizing the lead at the second fixation location comprises stabilizing the lead at the second fixation location using cellular adhesion at selected portions of coronary sinus vasculature.

59. The method of claim 54, wherein:

stabilizing the lead at the first fixation location comprises stabilizing the lead at the first fixation location using cellular adhesion at the first fixation location; and

stabilizing the lead at the second fixation location comprises mechanically stabilizing the lead at the second fixation location.

60. The method of claim 54, further comprising delivering a drug using the lead.